amount of information which has usually, and we think appropriately, been treated of by separate authorities. The book is, in fact, a sort of encyclopædia of bread-making, and this being the case, it is open to the faults of such works. The design or scope is too large, and the matter introduced to our notice is often too remotely relevant to the immediate wants of the reader. A definition of chemistry, a table of atomic weights, an explanation of chemical equations, atoms and molecules, are scarcely necessary in this connection. Similarly, we cannot approve of lessons upon polarisation of light, the uses of the microscope, and the *camera lucida* being introduced *in extenso* into a book specially treating of a technical subject like this. Such knowledge ought to be assumed as already possessed by the reader; and as well might the author have given instruction upon the origin and uses of decimal fractions, or led up to his subject by several preliminary volumes dealing with the whole "circle of the sciences." Certainly he lays himself open to the charge of instructing either too much or too little. He deals with abstract scientific problems lying at the root of chemistry, and with the vulgar processes of the cook and the baker; and treats with equal facility of the microscope and the flour-mill. We had rather leave the minuter criticism of this voluminous work to the many experts whom it concerns, and who will no doubt be ready to detect any errors into which the indefatigable and talented author may have fallen. If Mr. Jago is ever tempted to bring out a second edition, we may recommend the use of the pruning-knife, which, if judiciously and freely used, will leave a better proportioned but less bulky treatise in our hands.

JOHN WRIGHTSON

OUR BOOK SHELF

American Journal of Mathematics, vol. viii. No. 3. (Baltimore, July 1886.)

IN her note on "the binomial equation $x^p - 1 = 0$," Miss Scott gives a somewhat simpler form of the equation for quartisection than that given by Prof. Cayley (*L.Math. S.Proc.*, vol. xi. pp. 11-14), and works out the equation for quinquisection on apparently different lines from Mr. F. S. Carey's solution (cf. Prof. Cayley, *L.Math.S.Proc.*, vol. xii. and vol. xvi.). Mr. F. N. Cole furnishes "A Contribution to the Theory of the General Equation of the Sixth Degree," which is interesting from the historical details which he gives. He acknowledges his great indebtedness to Klein, but there is a good deal of original work in the note. Mr. J. C. Fields gives a neat "proof of the elliptic-function addition-theorem." The *pièce de résistance* of the number is, however, the long-looked-for notes of "Lectures on the Theory of Reciprocants," by Prof. Sylvester. These are designed as "a practical introduction to an enlarged theory of algebraical forms, and, as such, are not constructed with the rigorous adhesion to logical order which might be properly expected in a systematic treatise. The object of the lecturer was to rouse an interest in the subject, and in pursuit of this end he has not hesitated to state many results, by way of anticipation, which might, with stricter regard to method, have followed at a later point in the course." The lectures, which are ten in number, have been reported by Mr. J. Hammond. The subject, which, it will be remembered, was fully brought before our readers by Prof. Sylvester's inaugural lecture, printed *in extenso* in NATURE (vol. xxxiii. pp. 222–231), has already attracted many of our younger mathematicians, so that there is hope of the Professor's closing aspiration of creating "such a school of mathematics as might go some way at least to revive the old scientific renown of Oxford" being soon an accomplished fact.

The Non-Euclidian Geometry Vindicated: a Reply to Mr. Skey. (*Transactions* of Wellington Philosophical Society.)

A PAPER entitled "On the Simplest Continuous Manifoldness of Two Dimensions and of Finite Extent," by Mr. F. W. Frankland, was read before the London Mathematical Society, December 14, 1876 (*Proc.*, vol. viii. pp. 57-64), and was subsequently published in our columns (vol. xv. p. 515) This same paper, or one of similar character with identical title, appears to have given rise to a paper by Mr. Skey, which took the form of notes on Mr. Frankland's paper, and was read before the Wellington Philosophical Society on June 26, 1880 (published in the thirteenth volume of the *Transactions* of the New Zealand Institute). The pamphlet before us is an abridgment of a series of letters in which Mr. Frankland convincingly replies *seriatim* to the main points raised by Mr. Skey, and maintains his former ground by additional arguments.

LETTERS TO THE EDITOR

[*The Editor does not hold himself responsible for opinions expressed by his correspondents. Neither can he undertake to return, or to correspond with the writers of, rejected manuscripts. No notice is taken of anonymous communications.*

[*The Editor urgently requests correspondents to keep their letters as short as possible. The pressure on his space is so great that it is impossible otherwise to insure the appearance even of communications containing interesting and novel facts.*]

The Sense of Smell

I KNOW a person who has never been conscious of any odour from a bed of mignonette, and I know another person who has never been conscious of any odour from a bean-field. Both of these persons have the sense of smell acute and discriminating as regards other odours.

I know persons who cannot discover a difference between certain odours which are very different to ordinary persons. Then there are persons who are sickened by certain odours which usually give pleasure. A considerable number of persons seem to be altogether destitute of the sense of smell; and on the other hand there are a few who have the sense very strongly developed.

I am at present investigating peculiarities of this sense, and I shall feel obliged to any one who will furnish me with illustrations or examples—whatever their character may be—with such fullness and precision as will enable me to use them in a scientific inquiry.

ARTHUR MITCHELL

34, Drummond Place, Edinburgh, September 24

Palæolithic Implements in Cambridgeshire

FEW Palæolithic implements have, I believe, been discovered in Cambridgeshire, although they are abundant in the gravels of the neighbouring counties of Suffolk and Essex. It may therefore interest your readers to learn that three implements have lately been found near Kennet, on the surface of a field not far from the high-road from Newmarket to Thetford. Two of the implements are kite-shaped. One, of lustrous black flint, is acutely pointed, with sharp cutting edges, and has a part of the original crust of the flint left on one of the faces, which is less convex than the other. It has lost a portion of the butt-end, but is otherwise perfect. The third is a sharp-rimmed ovate implement, the surface of which is stained a deep ochreous colour. Portions of the original crust remain on the faces and base.

Two other implements of the pointed type have been found on the surface near Kennet, but are not in my possession.

In the winter of 1884–85 several implements and flakes were found in a ballast-pit opened by the Great Eastern Railway Company by the side of the line, about a mile and a quarter from Kennet Station, in the county of Suffolk. A reference to the Geological Map of the Ordnance Survey, Sheet 51, N.E., will show that the gravel in which this pit was opened is an extension of that which underlies the site of the above *surface* discovery. The implements from the ballast-pit which have come into my possession are of the kite-shaped and ovate types. Some are water-worn and abraded, in others the angles and edges are as sharp as if made yesterday.

ARTHUR G. WRIGHT

Sign-Numbers in Use among the Masai

AMONG the numerous tribes of Central Africa the Masai are distinguished by their use of finger-signs to denote numbers. These notorious warriors rarely ever use language to indicate numbers without accompanying signs on the fingers, though very frequently the latter are employed without the former, especially in answering questions.

As by some inadvertency I omitted giving a list of these signs in "Through Masai-Land," and Mr. Johnston, in his book "Kilimanjaro," has followed suit, it may still be of some interest and value to anthropologists to learn what these are.

English	Masai	Sign
1	Nabo	First finger held out alone
2	Aré	First and second fingers held out and alternately moved backwards and forwards
3	Uni	Thumb and two first fingers placed tip to tip
4	Unghwani	First and second fingers laid on top of each other
5	Umiēt	Thumb placed between first and second fingers
6	Ilé	Thumb scratched over nail of second finger
7	Nabishana	No finger indication
8	Usiēt	Hand held open and vertical and moved up and down
9	Naūdo	Thumb and first finger form a circle by joining the tips
10	Tomor	First finger drawn over the nail of the thumb
11	Tomoni-obwo	Same sign as in 10 accompanied by that for 1. The same rule for the succeeding numbers
20	Tikitum	The hand closed and opened rapidly
21	Tikitum-o-nabo	The same as 20, but followed by the sign for 1
30	Othman	First finger held out and shaken by a circular movement of the wrist
40	Artum	The hand held open and vertical and shaken or agitated by a circular movement of the wrist; not up and down as in 8
50	Unum	Thumb placed between first and second fingers, and hand agitated as in 40
60	Tomoni-ilé	Nail of thumb scratched on nail of third finger
70	Tomoni-nabishana	No finger indication
80	Tomoni-usiēt	Same as in 8, but sign never employed alone
90	Tomoni-naūdo	Same as in 9, but words always employed along with sign
100	Ipé	The partially closed hand opened once or twice
200	Ipé-aré	

JOSEPH THOMSON

A GLACIAL PERIOD IN AUSTRALIA

A GREAT many theories have been put forward to explain the extensive glaciation which repeatedly covered Europe and North America with enormous ice-streams. The ingenuity displayed by those who dealt with the subject was well worthy of the importance which attaches to the solution of the problem. However plausible some of the theories propounded may be, still it seems premature to approach such a question until all the available evidence bearing on the subject has been brought together. The southern hemisphere has, up till very recently, revealed only a few, and not very important facts, regarding glaciation, and it is evident that glacier traces in that hemisphere must be of great importance to explain the cause of glaciation; whether we may suppose it to be cosmic or terrestrial. I think, therefore, that my discoveries of glacier traces in Australia may be of sufficient general scientific interest to warrant my giving a short account of them in this journal.

Dr. von Haast, in his excellent work on the "Geology of Canterbury and Westland (New Zealand)" gave a detailed account of the traces of an extensive glaciation in the Middle Island of New Zealand, together with a map, showing that at one time the glaciers on the western slopes of the Southern Alps in many places reached down to the sea, and that those which descended from their eastern flanks covered a large portion of the lowlands extending between the mountains and the coast-line.

During my exploration of the central part of the Southern Alps I observed numerous old moraines and *roches moutonnées* in the area which, according to von Haast's map, had once been covered by glaciers. Particularly was I struck with the freshness of the striæ, the scratches and grooves in the steep and rocky precipices on the sides of Milford Sound, that jewel of the Southern Alps.[1] Capt. Hutton, who examined some of the other sounds has not discovered any glacial traces there.[2]

Even now the glaciers in New Zealand reach down to 700 feet on the west, and to 2000 feet on the east side, which shows that New Zealand must be subject to a very different climate to that in similar latitudes—44°—in the northern hemisphere. Like Patagonia, New Zealand is at the present day to a certain extent *in a Glacial period*. The much greater extent of the prehistoric glaciers shows, however, that it is now by no means *at the height* of its glaciation.

Although a Glacial period was shown to have existed in New Zealand, there have not up to now been any definite statements regarding this subject in the mainland of Australia. The Rev. Tenison-Woods[3] examined certain rocks in the Blue Mountains, an insignificant table-land to the west of Sydney, and came to the conclusion that these, which had been supposed to indicate ice-action, did not do so, and that in fact there was no evidence of a Glacial period in the Blue Mountains. Mr. Howitt[4] came to a similar negative result regarding certain gravels and conglomerates, which according to others indicated glacial action. Griffiths,[5] on the other hand, claims these and other conglomerates of Omeo and Gippsland as evidences of a Glacial period in Australia.

Prof. Tate[6] described some striated rocks found near Adelaide, and Stirling[7] has shown that there exist extensive traces of glacier action in certain valleys near Omeo.

I myself have,[8] in several papers, published some of

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[1] R. von Lendenfeld, "Der Tasmangletscher und seine Umgebung," Ergänzungsheft No. 75 von *Petermann's geographischen Mittheilungen*. "The Time of the Glacial Period in New Zealand," *Proceedings* of the Linnean Society of N.S.W. for 1885.

[2] F. M. Hutton, *Proceedings* of the Linnean Society of N.S.W. for 1885.

[3] *Proceedings* of the Linnean Society of N.S.W., vol. vii. p. 382.

[4] *Quarterly Journal* of the Geological Society of London, vol. xxxv. p. 35.

[5] "Evidences of a Glacial Epoch in Victoria," *Proceedings* of the Royal Society of Victoria for 1884.

[6] Tate, Anniversary Address, *Transactions* of the Royal Society of South Australia, 1879-80.

[7] T. Stirling, "Notes on some Evidences of Glaciation in the Australian Alps," *Proceedings* of the Royal Society of Victoria for 1885.

[8] R. von Lendenfeld, "Official Report on the Exploration of Mount Kosciusco to the Government of New South Wales" (Sydney, 1885.) "The Glacial Period in Australia," *Proceedings* of the Linnean Society of New South Wales for 1885. "Report on an Exploration of Mount Bogong," *Proceedings* of the Royal Geographical Society of Victoria for 1886.